IDRC-092e

SHARING EXPERIENCE

DEVSIS: An Information Service for Decision-Makers

DEVSIS Co-Sponsors

International Development Research Centre
International Labour Office
Organisation for Economic Co-operation and Development
United Nations Department of Economic and Social Affairs
United Nations Development Programme
United Nations Educational, Scientific and Cultural Organization

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IDRC IDRC-092e
Sharing experience — DEVSIS: an information service for decision-makers. Ottawa, IDRC, 1977. 20p.

/IDRC pub CRDI/. Monograph on the role of /DEVSIS/ in the dissemination of knowledge (/information dissemination/) acquired in the process of development — discusses the duplication of development efforts resulting from inadequacies in the information field; compatibility of DEVSIS with /INIS/ and /AGRIS/; organization and /information service/s of the proposed DEVSIS /information network/; participation in DEVSIS and the establishment of /national/ /information centre/s.

UDC: 002:338 ISBN: 0-88936-136-3

Microfiche Edition $1

Design and layout: S. Clerget-Vaucouleurs

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Sharing Experience

DEVSIS: An Information Service for Decision-Makers

This prospectus has been prepared to fulfill a directive of the DEVSIS Steering Committee. Considerable preparation was done by Scott Adams and the final version was written by Alexandre Dorozynski.

Il existe également une édition française de cette publication.
La edición espanola de esta publicación también se encuentra disponible.

The realization of a forestry development project requires far more than knowledge about the various species of trees and their utilization. Many problems of a technical, social, and economic nature will have to be solved. Where should one look for information concerning these multiple aspects? The DEVSIS system would enable a user to draw from the appropriate experiences of all member countries.

Photo: Jack Redden

Two Kinds of Knowledge

A few years ago, a geologist on staff with the United Nations was given the assignment of studying mineral resources in three Latin American countries. By sheer chance, it turned out that three years earlier, exactly the same assignment had been given to the same geologist, then working in another organization. A search through the files of that organization permitted him to locate rapidly the report that had been commissioned.

If this coincidence hadn't taken place, and if the assignment had been given to someone else, chances are the study would have been carried out once more. The results would have become available only months later, and the expense would have exceeded by far that of a few telephone calls. This authentic example is significant of the wastage of a resource essential to development: information. The work that had been carried out had not been indexed and made available to others who could benefit from it.

The statistical improbability of the coincidence is such that it is easy to conclude that in many comparable cases, pertinent references are not identified, work is duplicated, time and money are wasted. Such wastage is not limited to scientific or technical information.

Let us imagine that a tropical country intends to undertake the rational exploitation of the rain forests that cover a large part of its territory. It may have little experience in planned rural development and the multiple aspects it involves: investment, fiscal policy, management of a vast agricultural enterprise, theoretical and practical aspects of long-term economic planning, problems of land tenure and speculation, organization of a labour market and distribution of income, job analysis, transportation, urban logistics, educational facilities, social integration of a resettled population, not to mention the technical aspects of forestry, of the required machinery, the characteristics of the many species of wood, and the potential markets.

It is evident, however, that the project requires a major investment, perhaps several million dollars. How should one go about avoiding wasting time and money, and at the same time ensuring the best return for the investment and the harmonious development of a new human and economic venture? The answer may appear to be a truism: in order to plan and carry out the project, one needs information — or knowledge — about its many aspects. The real question is then, how does one go about obtaining this knowledge?

There are several answers. One way is to go ahead, relying on good sense and experience (however limited in this area), and learning from one's errors while progressing toward the objective. The objective may eventually be reached, but at great expense

and loss of time. Why repeat mistakes that others have made and corrected? Why waste resources for studies and experiments that others have conducted before?

A more efficient approach would be to identify, retrieve, and exploit existing knowledge about similar development projects that have been carried out elsewhere, in order to benefit from available experience. Such background information can be sought from business concerns, universities, international agencies, and governments or national agencies that may have been faced with similar problems. The number of potential sources of such information is enormous. Some are obvious, like the apparent tip of an iceberg. Others are invisible, as the submerged nine-tenths of the iceberg; they must be sought out and identified.

How should one determine whether an Asian, an American, or an African country has gone through a similar experience and possesses knowledge that will be useful to the solving of your own problem? How can one avoid relevant experience accumulating in one country and remaining buried in dusty files thousands of miles away from another country that could benefit from it?

The answer exists: it is to be found in the organization of information.

We are a scientific civilization, in which knowledge and its utilization are essential to progress. Science (which comes from the Latin word for knowledge) is the essence of all that has been learned since man has existed. A few centuries ago, it was still possible for a single man to know just about everything that was part of human knowledge. Such was the ideal of the Renaissance man, who could reasonably attempt to acquire a kind of "universal knowledge." He was personified by Giovanni Pico della Mirandola, the 15th century Italian thinker, gifted with a legendary memory and renowned for his erudition. On the basis of his profound personal knowledge of the philosophical, religious, moral, and scientific traditions of all civilizations, Pico della Mirandola wrote the "nine-hundred theses" that have immortalized his name.

Today, the time of the all-knowing Renaissance man is gone forever. Deep knowledge requires specialization, whether in solid-state physics, high-energy physics, endocrinology, topology, and so forth. Scientists today have difficulties in communicating among themselves across the gaps that separate their specialities, and no man will be able to know "just about everything" in depth. The heritage of human knowledge is too great for a single mind to comprehend in its entirety.

Yet this heritage exists, and every man can draw from it. In the 16th century, poet Francis Bacon could still write, "I have taken all knowledge to be my province," but in the

18th when science and its offspring, technology, were paving the way to the industrial revolution, this was no longer true. "Knowledge is of two kinds," the English author Samuel Johnson wrote at this time: "We know a subject ourselves, or we know where we can find information upon it."

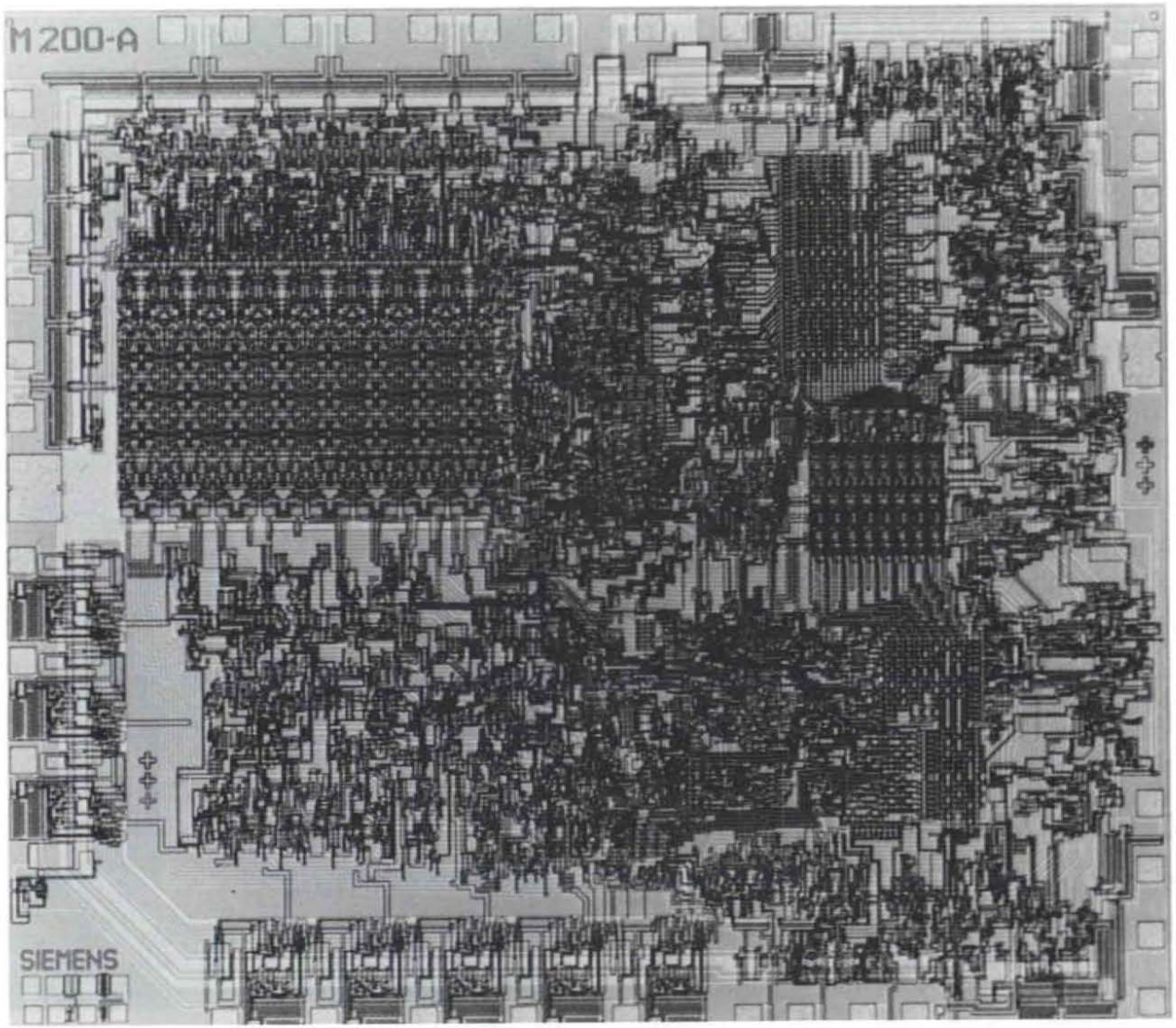
Today, "finding information upon knowledge" has become a science in its own right, and the technical means at its disposal portend a revolution no less in magnitude than the industrial revolution that has transformed the way of life of most people on earth.

Let us give an example to illustrate the extraordinary progress being accomplished in electronics and computer sciences, which are the tools of information science.

In 1959, the silicone chips used in building computers contained, each, a single component of an electronic circuit. Five years later, the number had reached 10 components per chip, and by 1970, about 1000. In 1976, chips were available containing more than 30 000 components each, and electronics experts have estimated that if the pace continues, integrated electronics circuits will be made before the end of the century containing 1 million elements each.

It is significant that while the cost of just about everything has been climbing up the inflationary spiral, the cost of computer functions has declined, and continues to do

Pico della Mirandola was said to know just about everything there was to know. (Photo: Alinari-Viollet)



Today, to compile even records of what knowledge exists, we need the memory of a computer.

so. One computer expert points out that a single unit of mass storage can store and provide rapid access to the equivalent of 25 million pages of single-spaced text (about 4000 characters per page) for a cost of under 2 cents a page.

If it is by coincidence that this revolution in computer science has taken place simultaneously with the exponential growth of human knowledge, it is a very fortunate coincidence indeed. The possibility for all to share the information capital is but a matter of good will and organization. DEVSIS (for Development Sciences Information System) is one of the projects that has been designed to advance toward the goal of pooling knowledge and experience acquired in the process of development, and making them available to those who need them. At the same time, it aims to familiarize people throughout the world with the indispensable tools of information science.

A Memory for the World

Most people will agree that development on the global scale necessarily implies the sharing of knowledge and experience. At the same time, few people, organizations, or governments, if any, would purposely withhold information that can be helpful to others, as long as it can be released without causing harm to themselves. But good will is not enough: there must be a concerted effort

The simple operation of a documentation centre is the initial requirement.

to organize knowledge and make it available. An experience has its maximal impact when its results are published, abstracted, indexed, and made available to potential users.

It has been estimated that national and international agencies engaged in development generate more than 100 000 reports each year. Each of them records some aspects of development experience that may be relevant to other situations. Articles published in accessible periodicals are estimated to represent about 20% of this recorded experience, and books, perhaps another 10 or 15%. There remains, unused, unavailable, and as if deliberately hidden, the results of about two-thirds of the effort.

This is the wasted crop, sometimes literally eaten up by pests. The loss is inestimable: it is not that of the paper upon which the results of research projects have been laid, but of the human thought, effort, time, and money that have been expended.

DEVSIS proposes to apply new information-system technology to provide those engaged in development tasks with better access to the invisible, as well as the visible, part of this information iceberg. In short, DEVSIS is to be a global memory that will contribute to the solution of tomorrow's development problems the experience that has been accumulated yesterday and that is being acquired today. In addition to providing information, it will help spread information technology that comprises a vast range of processes for storing information, for copying or otherwise duplicating it, for transmitting it from one place to another, and for transforming it in answer to specific needs.

DEVSIS may be likened to an international monetary fund. Member countries as well as international and regional agencies will deposit information concerning their development experience. The records will be pooled, and their existence made known through the publication and dissemination of announcements. Member countries will, in turn, "draw" from the pool those items that they need for their own development purposes. But in fact, this comparison is unfair, because an information system is far more than a "banking operation": banks handle money, and when credit is exhausted, so is the possibility of drawing funds. Information is inexhaustible; once it is deposited, pooled, processed, and made available, the vaults remain full no matter how much of it is drawn by those who need it.

The mechanics of DEVSIS are largely patterned upon an existing model, the International Nuclear Information System (INIS), a remarkable example of information sharing among nations. The history of INIS dates back to 1966, when the United States and the Soviet Union jointly recommended that the International Atomic Energy Agency (IAEA) in Vienna should make an attempt to build a truly international nuclear information system.

After three years of design and negotiations, the system began to operate in a very preliminary way in 1970. Now it processes at least 90% of all available nuclear information recorded in documents (about 70 000 per year); it has become a tool none of its users would want to give up.

The organization and structure of INIS are really quite simple. Each participating country agrees to report the documents produced in its own territory. It must, of course, follow certain international standards in the preparation of its records. With the IAEA providing detailed instruction manuals

and, when necessary, training courses, this has proven to be quite feasible. In fact, the utilization of these standards has not only permitted the harmonization of thousands of records within the INIS system, but it has helped many member countries to organize their own information systems more rationally.

When the records from the participating countries are received by the central unit in Vienna, they are entered into a computer, checked, and automatically classified. Twice a month a new increment to the "world file" becomes available and each member country can receive (in return for its national input) a list of what all other countries have contributed. The index to the "world file" is made available on magnetic tape, for those who wish to manipulate it in computers, as well as in printed form. Each country can then process and use the "world file" according to its own needs, policies, and rules.

International management and central-processing costs represent only a small percentage of the IAEA budget. Yet, these funds cover one of the most tangible and useful services the agency provides to its member countries.

Another information system, the International Information System for the Agricultural Sciences and Technology (AGRIS), also patterned upon INIS, has been operative since 1975 under the aegis of the United

Many developing countries invest money and talent to plan their industrial development, but few believe that they have the process of industrialization under society's control.

The processing of AGRIS input at the International Atomic Energy Agency computer centre, Vienna.

Nations Food and Agriculture Organization. The goal is to provide the world with an "agricultural memory," just as INIS provides its members with a memory in nuclear science and technology.

Significant achievements can already be credited to AGRIS, which now has 70 participating countries. The system works along the same lines as INIS (in fact, it uses existing INIS computer facilities in Vienna). Participating countries send bibliographic entries to the AGRIS coordinating centre, and the total input is, likewise, processed on computer, which generates data printed as a monthly bibliography called *Agrindex*. (The "carrier language" of AGRIS is English, but titles are also given in the original language of each publication requested.)

Magnetic tapes are also made available to participating governments and agencies: from these tapes, computers can extract items corresponding to specific interests — for example, information about the characteristics of different varieties of wheat, or about methods to extract protein from cottonseed. Several AGRIS member countries have started producing such selective announcement services; Brazil, for instance, distributes

selected information items to 1000 users every month.

In 1975, AGRIS processed some 50 000 references, and in 1976, 75 000. The number is expected to reach 200 000 and to remain approximately at that level.

The AGRIS system is compatible with other information systems, such as INIS, and follows the norms and guidelines laid down by UNISIST, Unesco's program to rationalize global scientific and technical information services, so that as these networks develop, they can be linked. DEVSIS, of course, will also be compatible, so that the range of available information will increase, while the technical means of processing it remain the same. Meetings and seminars, held on all continents, have familiarized AGRIS participants with this technology, and comparable training facilities are planned for DEVSIS.

The DEVSIS Design

The preliminary design of the DEVSIS system has been prepared by a steering committee appointed by six cosponsoring organizations: the International Development Research Centre (IDRC), the International Labour Office (ILO), the Organization for Economic Co-operation and Development (OECD), the United Nations Department of Economic and Social Affairs (UN/ESA), the United Nations Development Programme (UNDP), and the United Nations Educational, Scientific and Cultural Organization (UNESCO). The underlying philosophy is that the sharing of information and its effective transfer to and among developing nations are essential to human progress, and should be an integral part of a "New International Economic Order."

At the basis of the system is the acceptance by each country participating in DEVSIS of the responsibility to contribute standardized records of the relevant documents generated within its territory. The DEVSIS central unit will convert these records to machine-readable form, merge them with the contributions of other national units, and produce a monthly index publication, called *Devindex*. In addition, the central unit will make the same collection of data available on magnetic tape in a form that can be searched in a computer.

The national DEVSIS centres, both in developing and developed countries, are thus the foundation of the network. They will identify and report to the central unit development information generated in member countries. More importantly, they will identify their own needs for development information, and provide their own experts with tailor-made services from the stores of information received from the central unit. The pattern, in other words, will be similar to that of INIS and AGRIS. It will, of course, benefit from the previous experience of these

information systems. Equal accessibility to worldwide records is a key aspect of the DEVSIS system. A developing country will have the same ready and selective access to information as rich countries. The indexing will be very detailed, enabling the user to home in on what he really needs and then to order documents with confidence that what he will receive will be relevant.

Who will be the users?

Within developing countries, there are generally three broad categories of institutions involved in the development process:

- government agencies responsible for national plans for socioeconomic development and ministries with special programs for development;
- financial organizations responsible for the allocation of financial resources;
- universities and research centres responsible for studies and research essential to the development process.

In developed countries, there are the international bilateral or private agencies concerned with development, and also, the research centres and universities engaged in studies related to development.

Within these institutions will be found most of the users of DEVSIS, and also most of the originators of the information DEVSIS is designed to handle.

The national DEVSIS centre will make available to these institutions development information from other countries, as well as from the country itself, and it will be able to assist them in the selection of the information that is most pertinent to the problem in hand. Once a problem has been recognized, the system may be used to answer questions such as these: "What related problems have been studied, and with what results?" "What solutions have been proposed?" "Which have been tested?" "Which have been discarded, and why?" "What new technologies or methods exist that may be applicable in the solution of the problem?"

To those engaged in making socioeconomic policy decisions and in implementing development programs, DEVSIS will be a prime source of information. The development process constantly innovates and introduces new procedures and new strategies, and DEVSIS will be a mine of such up-to-date information derived from experts throughout the world. An important aspect is that information will be not only vertical — from developed to developing countries — but also horizontal — from one developing country to another. Such horizontal transmission is now particularly deficient; yet in many cases, a developing country can benefit more from the experience of another developing country than from the experience of a rich country, where the setting and the problems are often quite different.

Some DEVSIS Services

In brief, these are the services the DEVSIS centre will make available to its member countries:

Publications — *Devindex* will be the principal published product of the DEVSIS system: an index to all the items of information reported by the participating countries and merged at the central unit. It will have supporting indexes by subject, geographic location, author, and by report number. *Devindex* (in English, French, and Spanish, and perhaps in Arabic) will facilitate conventional literature searches and selective dissemination of information services on a "manual" basis.

Machine-Readable Files — These improve enormously man's capability to select rapidly and precisely. Many users feel overwhelmed by the vast amount of information that is available for development purposes today: some 100 000 items a year! But the search capabilities of computer-based retrieval systems make it possible to screen out or suppress most of the irrelevant information, to shield the user from "information overload."

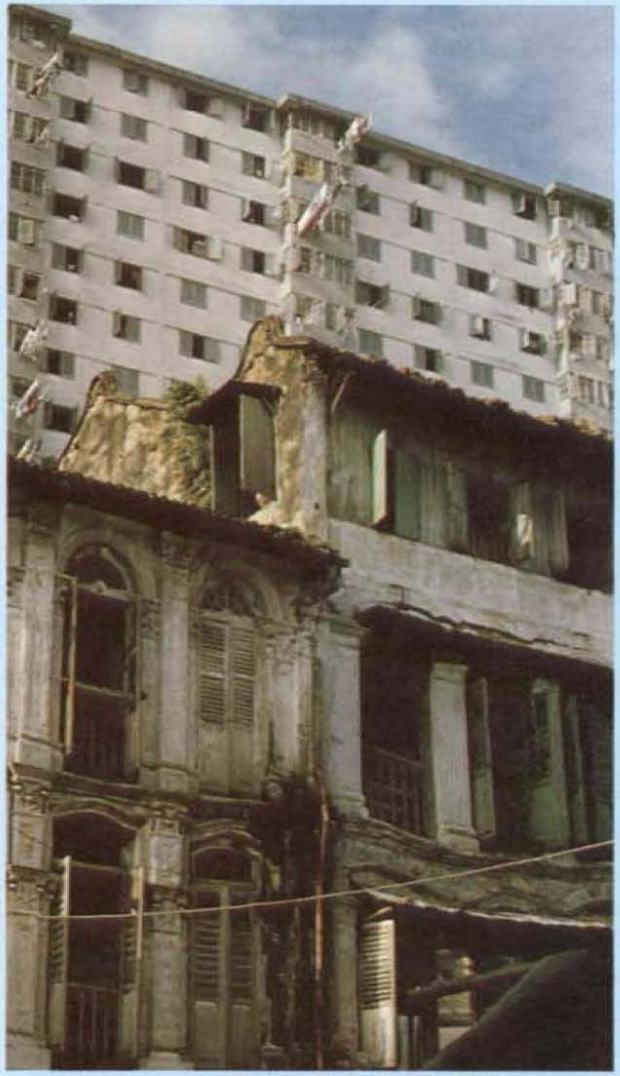
The DEVSIS central unit will prepare and distribute magnetic tapes bearing, in machine-readable form, the same information from which *Devindex* is compiled. The format of such information will correspond to internationally agreed standards for the exchange of bibliographic information, to facilitate merging with other machine-readable information files.

From this magnetic-tape base a number of information services are possible. Among these are retrospective search, selective dissemination of information, and recurring bibliographies.

Retrospective Search. It will be possible to search the DEVSIS file retrospectively by subject, author, and geographic and language fields, and even for specific statistical and investment data. For purposes of subject indexing, a specially designed standardized vocabulary will be used, and the same vocabulary will be used in computer searches to obtain a selection relevant to the user's needs.

Current Awareness Services. Services wil be made available to users wishing to monitor, over a period of time, developments in a highly specific field. Where the need is more generalized, this service can be expanded to match the interest of a group of subscribers: thus, if groups such as transportation planners, rural development specialists, or investment decision-makers are interested in the experience of all countries in the fields of their special interests, a "recurring bibliography" can be developed for their use.

It will also be possible to merge a selection of machine-readable references



Urban development has many complex facets. Here, in the background, a low-cost housing project in Asia.

received from DEVSIS with a selection of references received from, say, AGRIS. For example, a participant interested in forestry development may draw from DEVSIS pertinent information related to the social, economic, financial, and management aspects of his project. At the same time, he will receive from AGRIS technical information concerning different species of tropical wood, methods of processing and conservation, utilization of pesticides, etc.

Referral Service — The basic bibliographic services and products of DEVSIS will be derived from the information in "File One," namely the bibliographic records of government and international documents, books, periodical articles, reports, unpublished studies, etc. The DEVSIS central unit will also prepare a "File Two," on which the national centres may build their referral services.

"File Two" will contain descriptive information about *sources* of development information throughout the world, such as statistical services, information services in particular sectors, registers of ongoing research and development, indexes of equipment manufacturers, specialized magazines, and bulletins. Whereas "File One" is intended to supply references to what particular information exists, "File Two" is intended to help the user locate other sources of specialized information.

The central unit will publish periodic compendia of "File Two" information under the title *Devprofile*, and at the same time will make the information available on magnetic tape to be searched by the national participants. The national DEVSIS centre will use *Devprofile* to refer its users to sources of specialized information throughout the world.

Document Availability — It is most frustrating to hear of a report that would be essential to a project but that is not available locally and whose supplier is unknown. In anticipation of a need to make the full texts of documents available to the user, the DEVSIS Steering Committee has proposed a microfiche back-up service to provide the full texts for some 60 000 nonconventional reports annually. The central unit will make these microfiches, or if desired paper copies derived from them, available to the national DEVSIS centres at cost. Such charges will always be payable in national currency.

Participation Requirements

The first step a country wishing to participate in DEVSIS should take should be to commit itself to encouraging the United Nations to have DEVSIS adopted as an international program. Only if this step is taken in collaboration with other countries will DEVSIS come into being.

Then the country should establish a national centre in an appropriate agency, develop an operational plan, and participate in the organization and governance of the regional and global DEVSIS activities. To ensure the healthy evolution of the system, constructive criticism should be fed back to the DEVSIS central unit from all participants. Thus, while each country will shape the DEVSIS products and services to its own needs, it will also contribute to the sound development of the program on a global and regional scale.

National commitment requires knowledge of the features of the DEVSIS proposal, of the potential information users in the country, and imagination to visualize potential benefits.

Indeed, even though a decision to participate in DEVSIS may not be immediately achieved, it is desirable for a country's effective management of its own development program that it establish a national centre to collect and disseminate the information from the many agencies involved in national development. Only after this step is taken can the next one — international cooperation — follow.

Establishment of National DEVSIS Centres — Many countries already have documentation centres located in their national planning agencies, development banks, institutes for socioeconomic research, or statistical offices. These can be associated with the new DEVSIS program. Ideally, then,

no new institutional infrastructure should be necessary for DEVSIS. But if there is no documentation centre amenable to DEVSIS purposes, the choice location for a new centre is in that government agency that has the greatest concentration of information users and decision-makers concerned with the innumerable fields of human endeavour associated with the process of development.

Development of an Operational Plan — Once the location has been determined and a project leader selected, an effort should be made to establish data of two types:

National Document Production. A survey of the development-related information produced by the entire institutional complex concerned with the planning and management of national programs for socioeconomic development is a fundamental step. What deposits or documentation centres now exist? Where are the retrospective files of these reports, and how extensive are they? What is their anticipated rate of growth in the future? These data are essential to estimate the volume of material to be processed and reported, and hence to estimate the costs to the country.

Survey of User Population. A second necessary preliminary step is to survey the potential users of DEVSIS products. How many are there? Where do they work? Where do they now go for their information? How do they currently characterize their needs? This initial survey may well be a preliminary step to a series of continuing contacts. Having an informed and concerned user population is the best way to get optimum benefits from the investment made in the system.

The information gained in a survey of the national production of development information and of the users of such information will provide the basic data for defining operational plans. At this point, the DEVSIS central unit will be in a position to offer technical support and advice to the participating countries.

An early determination should be made by the participating country of the degree to which the preparation of input for the DEVSIS central unit is to be mechanized. The central unit will accept inputs in a variety of forms, ranging from typewritten worksheets to magnetic tape. The decision is dependent upon the resources available within the country: a phased plan, starting with manual operations and converting later to machine-readable input, may be the best solution, leading to the training of a team of competent information science specialists.

Costs — The proposed organization of DEVSIS determines the partition of costs:

The costs of preparing the *inputs* will be met at the national level. National staffs and national currencies will be used. The national contribution to DEVSIS will be in kind, rather than cash. The work of preparing input to

DEVSIS, since this covers only the nation's own production of information, will cost only what it would cost to maintain a national inventory of development information, and this, after all, is a basic tool for the country's own development endeavours.

The costs of the DEVSIS central unit would be funded by one or more of the agencies of the United Nations.

The cost of providing *outputs and services* again would be met at the national level, with each country free to determine its policy for cost-recovery. Like the cost of inputs, these would involve the use of local staffs and local currencies. Local cost can be kept low through the association of the DEVSIS national centre with an existing documentation centre that already has resources and experience to contribute. It may be expected that assistance for the establishment of national centres, and for the initial training of staff, may be available through the United Nations.

In many countries, farmers own bits and pieces of land, sometimes remote from one another. This map shows the progression of a land tenure research project in Africa. How did villagers go about reaching an agreement to exchange land among themselves to everybody's benefit? This type of socioeconomic information will also be found in DEVSIS.

A Purpose, A Commitment

We have seen that information, acquired at great cost, is often wasted. Such wastage is not always accidental. On occasions, specialized commercial research concerns have even been known to charge twice for the same study, because no readily accessible records had been kept of the first submission of the results.

Even more outlandish — but nonetheless authentic — examples can be given to illustrate the neglect with which information may be treated, even if it was costly to obtain, when it is not considered to be immediately usable. One researcher, working on an urban development project, observed that the meat he had purchased at a butcher's was wrapped in a few typewritten sheets of paper that, he later discovered, turned out to be part of a unique copy of a hydrological survey that had not been found usable at the time it was completed. The example is extreme, but the fact remains that as long as efficient information systems are not established, information — a resource essential to progress and development — will be wasted in large amounts.

DEVSIS will be part of such an information network. But it must be emphasized that DEVSIS will come into being only if a sufficient number of countries want it and are willing to work for it through appropriate agencies of the United Nations. DEVSIS cannot operate without sponsorship by the United Nations and commitments of national participation.

Initial participation in DEVSIS will not require sophisticated technology. But gradually, the participants will become increasingly involved in the "information revolution" that is already taking place. Meetings and seminars, held on all continents, will help them become familiar with and keep abreast of a new technology of "mind-helping machines" that may be as important to continued progress as have been the "muscle-helping machines" of the industrial revolution. This technology will help them organize their own information systems, as well as benefit from the constant flow of information coming from the rest of the world.

A meeting of the DEVSIS steering committee. Mr Henry, second from right.

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